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# (12) United States Patent

Mizoguchi et al.

## (54) VARIABLE DISPLACEMENT HYDRAULIC MOTOR/PUMP

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See application file for complete search history.

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#### (57) ABSTRACT

In a variable displacement hydraulic pump/motor, a casing includes a tapered roller bearing supporting a rotating shaft near supports, the support has a sliding protruding portion in a spherical shape at a shaft portion, and a through oil path extending from the shaft portion to the sliding protruding portion, the support being fitted, at the shaft portion, in a mounting hole in the casing and being fitted, at the sliding protruding portuding portion, in a sliding recessed portion in the swash plate to cover an opening of the through oil path, a communicating oil path is between a space in which a tapered roller of the tapered roller bearing is disposed and the mounting hole, and a lubrication groove constantly connecting the opening of the through oil path to an outside of a sliding contact area between the sliding protruding portion and the sliding recessed portion.

## 5 Claims, 5 Drawing Sheets



